CLAIMS

1. An ethylene-based polymer which is an ethylene/C4 to C10 α-olefin copolymer and satisfies the following requirements [k1] to [k3] simultaneously:

[k1] melt flow rate (MFR) under a loading of 2.16 kg at 190°C is in the range of 1.0 to 50 g/10 minutes;

[k2] LNR defined as a scale of neck-in upon film molding is in the range of 0.6 to 1.4; and

[k3] take-up speed at break [DS (m/min)] at 160°C and melt flow rate (MFR) satisfy the following relationship (Eq-1):

$$12 \times MFR^{0.577} \leq DS \leq 165 \times MFR^{0.577} \qquad \text{(Eq-1)}$$

2. The ethylene-based polymer according to claim 1, which simultaneously satisfies the following requirements [m1] to [m3]:

[m1] density [d] is in the range of 890 to 950 kg/m$^3$;

[m2] ratio [MT/η* (g/Poise)] of melt tension [MT (g)] at 190°C to shearing viscosity [η* (Poise)] at 200°C at an angular velocity of 1.0 rad/sec. is in the range of $2.00 \times 10^{-4}$ to $9.00 \times 10^{-4}$; and

[m3] sum [(A+B) (/1000C)] of the number of methyl branches [A (/1000C)] and the number of ethyl branches [B (/1000C)] per 1000 carbon atoms measured by $^{13}$C-NMR is 1.4 or less.

3. The ethylene-based polymer according to claim 1 or 2, which satisfies at least one of the following requirements [n1] to [n3]:

[n1] ratio (Mz/Mw) of Z-average molecular weight (Mz) to weight-average molecular weight (Mw), measured by GPC, is 10

or more;

[n2] the number of terminal vinyl groups (V) per molecular chain calculated from the number of terminal vinyl groups [v (/1000C)] per 1000 carbon atoms measured by IR and number-average molecular weight (Mn) measured by GPC is not higher than 0.47 per molecular chain; and

[n3] melting-point maximum peak [Tm (°C)] in DSC and density (d) satisfy the following relationship (Eq-2):

$$(0.315 \times d) - 200 \leq Tm \leq (0.315 \times d) - 170 \qquad \text{(Eq-2)}$$

4. The ethylene-based polymer according to any one of claims 1 to 3, which is obtained by polymerization using an olefin polymerization catalyst formed from:

a solid carrier, and

(A) a solid transition metal catalyst component obtained by contacting:

(a) a compound of a transition metal of the group 4 in the periodic table, containing at least one ligand having a cyclopentadienyl skeleton,

(b) an organoaluminum oxy compound, and

(c) a multifunctional organic halide represented by the following general formula (I):

$$(Q^1)_o\text{-}R\text{-}(Q^2)_p \qquad \text{(I)}$$

wherein R is a (o + p)-valent group containing at least one halogen atom, o and p each represent a positive integer satisfying the relationship $(o + p) \geq 2$, $Q^1$ and $Q^2$ each represent -OH, $-NH_2$ or -NLH whereupon L is an arbitrary group selected from a C1 to C20 hydrocarbon group, a C1 to C20 halogen-containing hydrocarbon

group, a silicon-containing group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group and a phosphorus-containing group, and L and R, N and R, or N and N may be bound to each other to form a ring, and if necessary

(d) an organoaluminum compound, and if necessary

(B) an organoaluminum compound.

5. The ethylene-based polymer according to claim 4, which is obtained by polymerization using a catalyst formed from:

a preliminary polymer having a z-average molecular weight of 6,000,000 or more by GPC and having a die-swell ratio of 1.4 or more, pre-polymerized by ethylene, or ethylene and a C4 to C10 α-olefin, with the solid transition metal catalyst component, wherein 0.01 to 1000 g of the polymer is contained per g of the solid transition metal catalyst component, and if necessary

(B) an organoaluminum compound.

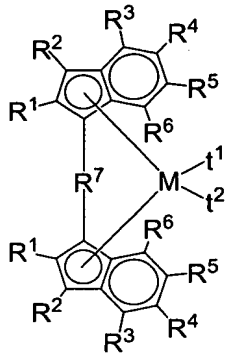
6. The ethylene-based polymer according to claim 4 or 5, wherein the multifunctional organic halide (c) is a compound represented by the following general formula (I):

$$(Q^1)_o\text{-}R\text{-}(Q^2)_p \qquad (I)$$

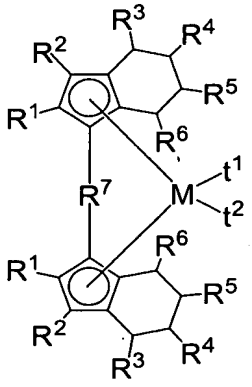
wherein R is a (o + p)-valent group containing at least one halogen atom, o and p each represent a positive integer satisfying the relationship $(o + p) \geq 2$, $Q^1$ and $Q^2$ each represent -OH, $-NH_2$ or -NLH whereupon L is an arbitrary group selected from a C1 to C20 hydrocarbon group, a C1 to C20 halogen-containing hydrocarbon group, a silicon-containing group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group and a phosphorus-containing group, and L and R, N and R, or N and N

may be bound to each other to form a ring.

7. The ethylene-based polymer according to any one of claims 4 to 6, wherein the compound (a) of a transition metal of the group 4 in the periodic table, containing at least one ligand having a cyclopentadienyl skeleton, is a compound represented by the following general formula (II), (III) or (IV):



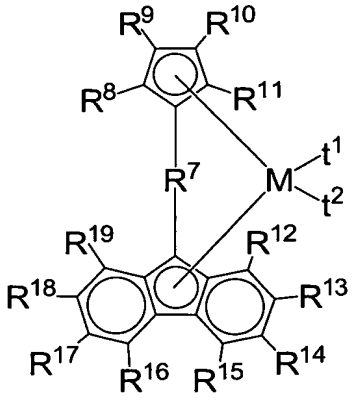

(II)




(III)

wherein $R^1$ to $R^6$ are independently selected from a hydrogen atom, a halogen atom, a C1 to C20 alkyl group, a C3 to C20 cycloalkyl group, a C2 to C20 alkenyl group, a C6 to C20 aryl group, and a C7 to C20 arylalkyl group, respectively, and can contain a silicon, halogen or germanium atom, and at least one pair of

$R^3$ and $R^4$, $R^4$ and $R^5$, and $R^5$ and $R^6$ may be bound to each other to form a ring, $R^7$ is a divalent group having two ligands, and is a C1 to C20 hydrocarbon group, a C1 to C20 halogen-containing hydrocarbon group, a silicon-containing group or a germanium- or tin-containing group, and two substituent groups on the same carbon, silicon, germanium or tin atom may be bound to each other to form a ring, $t^1$ and $t^2$ independently represent a group selected from a hydrogen atom, a halogen atom, a C1 to C20 hydrocarbon group, a C1 to C20 halogen-containing hydrocarbon group, a silicon-containing group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group and a phosphorus-containing group, respectively, and M is a transition metal selected from titanium, zirconium and hafnium,




(IV)

wherein $R^7$, $t^1$, $t^2$ and M each have the same meaning as defined in formula (II), $R^8$ to $R^{19}$ independently represent a hydrogen atom, a halogen atom, a C1 to C20 alkyl group, a C3 to C20 cycloalkyl group, a C2 to C20 alkenyl group, a C6 to C20 aryl group or a C7 to C20 arylalkyl group, respectively, and can contain a silicon,

halogen or germanium atom, and adjacent substituent groups out of $R^8$ to $R^{19}$ may be bound to each other to form a ring.

8. A thermoplastic resin composition comprising the ethylene-based polymer according to any one of claims 1 to 7.

9. A molded product obtained from the ethylene-based polymer according to any one of claims 1 to 7.

10. A molded product obtained from the thermoplastic resin composition according to claim 8.

11. The molded product according to claim 9 or 10, wherein the molded product is a film.